Summary Minutes of the
U.S. Environmental Protection Agency (EPA)
Science Advisory Board (SAB)
Committee on Valuing the Protection of Ecological Systems and Services
Initial Background Workshop
October 27, 2003, J. W. Marriott Hotel, Washington, DC

Committee Members: (See Roster – Attachment A)

Date and Time: 9:00 a.m. – 5:45 p.m., October 27, 2003 (See *Federal Register* Notice - Attachment B)

Location: J. W. Marriott Hotel
1331 Pennsylvania Avenue, NW
Washington, DC 20004

Purpose: The purpose of this workshop was to provide a brief introduction for the Committee to the major types of EPA decisions involving valuing ecological systems and services, current EPA tools, and EPA's needs.

Attendees:

Chair: Dr. Domenico Grasso

SAB Members:
Dr. William Ascher
Dr. Gregory Biddinger
Dr. Ann Bostrom
Dr. James Boyd
Dr. Terry Daniel
Dr. A. Myrick Freeman
Dr. Dennis Grossman
Dr. Robert Huggett
Dr. Klaus Lackner
Dr. Douglas MacLean
Dr. Harold Mooney
Dr. Richard Norgaard
Dr. Louis Pitelka
Dr. Holmes Rolston
Dr. Joan Roughgarden
Dr. Mark Sagoff
Dr. Kathleen Segerson
Dr. V. Kerry Smith
Dr. Valerie Thomas
Dr. Barton Thompson, Jr.

SAB Staff: Dr. Angela Nugent, Designated Federal Officer
Dr. Vanessa Vu, Director, SAB Staff Office

Agency Presenters at the Workshop (In Order of Appearance on Agenda):

Ms. Louise Wise, Acting Deputy Associate Administrator, Office of Policy Economics and Innovation
Dr. Albert McGartland, Director, National Center for Environmental Economics, Office of Policy Economics and Innovation
Dr. Michael Slimak, Associate Director for Ecology, National Center for Environmental Assessment, Office of Research and Development
Ms. Jerri-Anne Garl, Director, Office of Strategic Environmental Analysis,
Dr. Cory Berish, Chief, Planning and Analysis Branch, Region IV
Mr. Steven Young, Associate Director, Environmental Analysis Division, Office of Environmental Information
Dr. Michael Shapiro, Deputy Assistant Administrator, Office of Water
Mr. Robert Brenner, Deputy Assistant Administrator, Office of Air and Radiation
Mr. James Jones, Director, Office of Pesticide Programs
Dr. Robert E. Lee, II, Chief, Economic and Policy Analysis Branch, Office of Pollution Prevention and Toxics
Mr. Deveraux Barnes, Director, Office of Program Management, Office of Solid Waste and Emergency Response
Mr. Geoffrey Anderson, Director, Development, Community and Environment Division Office of Policy, Economics, and Innovation

Other Participating Agency Staff:

Ms. Lynne Blake-Hedges, Office of Pollution Prevention and Toxics Dr. Linda Chappell, Office of Air and Radiation
Dr. David Charters, Office of Solid Office of Solid Waste Mr. James DeMocker, Office of Air and Radiation Dr. Sharon Hayes, Office of Water
Dr. Sabrina Lovell, Office of Policy, Economics, and Innovation
Dr. Steve Newbold, Office of Policy, Economics, and Innovation
Dr. Nicole Owens, Office of Policy, Economics, and Innovation
Mr. John Perrecone, Region V
Dr. John Richardson, EPA Region IV
Dr. David Widawsky, , Office of Pesticide Programs
Dr. TJ Wyatt, Office of Pesticide Programs

Meeting Summary

The discussion generally followed the issues and as presented in the Workshop Agenda, with some modifications (See Workshop Agenda - Attachment C). The workshop lasted until 5:45 p.m. on October 27, 2003. Two members of the public addressed the Committee.

Introduction and Welcome from EPA SAB Staff Office

Dr. Angela Nugent, Designated Federal Officer (DFO) for the Committee on Valuing the Protection of Ecological Systems and Services, called the meeting to order at 9:00 a.m. and welcomed Committee members, Agency staff, and members of the public to the initial background workshop on valuing the protection of ecological systems and services. She introduced Dr. Vanessa Vu, SAB Staff Office Director, and Dr. Domenico Grasso, Committee Chair.

Dr. Vu welcomed attendees and extended her thanks to Dr. Grasso and the distinguished members of the Committee on behalf of the Acting Administrator. Dr. Vu stressed the importance of the Committee's charge, noting it is a challenging one that will require the breadth of expertise represented by Committee members. She also thanked Ms. Louise Wise, Acting Deputy Associate Administrator, Office of Policy, Economics, and Innovation (OPEI) and other representatives of the Agency for taking time away from their pressing duties to participate in the workshop. Dr. Vu also expressed her appreciation to Dr. Nugent and other members of the SAB staff for their exemplary efforts in assembling the Committee and preparing for the workshop.

Purpose of Workshop and Introduction of Members of the Committee and Agency Workshop Presenters and Key Staff

Dr. Grasso extended his personal welcome to members of the Committee and his thanks to Drs. Nugent and Vu for their preparatory work. He reminded members that the purpose of the workshop is to provide key background information in preparation for the next day's consultation. Dr. Grasso noted that the Committee has an overall charge, to improve the science in the field of valuing ecological systems and services, and he expressed his sincere hope that the Committee's advice to the EPA will lead to improvements in ecological services. He further noted that some of best experts in the world on this topic were present to provide input.

At Dr. Grasso's request, Committee members and participating Agency staff introduced themselves.

Welcome and Introduction to EPA's Interest in Developing and Implementing a Strategic Plan for Ecological Benefits

Ms. Wise opened by noting that implementing a strategic plan for ecological benefits was a very important endeavor for the Agency. Her remarks centered on four areas: first, the need for action on the subject of valuing ecological systems and services; second, what the EPA has done so far in the field; third, why an Agency strategy is needed now; and fourth, what the Agency has done to get started on developing a strategic plan.
Ms. Wise commented that while there is agreement that EPA has done great job over the last 30 years on clean air and clean water in terms of addressing the "low-hanging fruit," particularly in the field of human health, clearly there are more complex ecological problems to consider. The interrelationship of ecosystems and humans must be addressed, particularly in critical areas such as habitat loss. The Agency must renew its efforts to address how human activities affect ecosystems. The time is ripe for a concerted effort to increase awareness and give the Agency the ability to explain to the public the value of Agency efforts to protect ecosystems, she said. Tight budgets are also influencing Agency actions, Ms. Wise stated, and costs imposed on states and society in general are under increased scrutiny to ensure activities are worthwhile. Benefits from regulatory actions must be proven to be worth the cost. Ms. Wise explained that when the Agency cannot justify program costs, it is compelled to take less costly actions that are not as always as effective.

Ms. Wise cited as an example a recent regulatory situation related to 316b of the Clean Water Act (CWA) regarding the effects of drawing in cooling water. Because there was insufficient data on geographic distributions of the effect on fish populations, the Agency was compelled to rely on data regarding use benefits such as recreational water skiing. She also referred to Combined Animal Feed Operation (CAFO) requirements where there is a nutrification impact on estuaries, yet the EPA was unable to monetize benefits because it lacked ecological and economic valuation models. The only data available in this case was based on two recreational fishing areas in North Carolina; there was no data on other categories of goods and services protected. These regulatory needs are ongoing and urgent, she said.

Ms. Wise delineated some activities the EPA has undertaken relating to valuing ecological services and systems, noting that there has been a lot of "start and stop." One such effort, begun in 1990 by the Office of Policy, Planning and Evaluation was an Ecosystem Valuation Forum consisting of a series of workshops. The effort gave way to other pressing needs. In 1996, the Agency began its efforts to develop an Environmental Risk Assessment Framework, which resulted in Ecological Risk Assessment Guidelines, published in 2002. She commented that while these programs made great progress, they were not as integrated as they needed to be.

Ms. Wise stated that the time is right now for an Agency-wide, coordinated effort to achieve more effective results. EPA program offices are committed because they recognize that demand for an ecological valuation strategy growing. There is a sense of urgency because the set of environmental problems facing the Agency require more

refined ecological valuation methods. Even though the remaining problems are difficult, there are better models and spatial data available to address the complexities.

Ms. Wise reported that Mr. Tom Gibson, the former Associate Administrator for OPEI, had initiated the current process, and he was quickly joined by OW and the Office of Research and Development (ORD). An Agency editor's group and a management group were formed last spring, and both groups have been meeting regularly. Dr. Nicole Owens, National Center for Environmental Economics (NCEE), is serving as chair. The Agency's goal is to have a draft strategic plan by early 2004. Ms. Wise stated that the Agency is seeking practical advice from the Committee on improving models and methods, and she said that each of the workshop presentations will give an idea of the needs of each program office. She concluded by taking questions from Committee members.

A Committee member asked for clarification on the document planned for 2004. Ms. Wise answered that the Agency is planning to develop an internal strategic plan, represented by the draft "Ecological Benefits Assessment Strategic Plan" given to the Committee for review. There will be a subsequent effort to set priorities, determine how to proceed, and consider program funding.

In response to a question about default assumptions used by the Agency for ecological risk assessment and benefits assessment, Dr. Albert McGartland, Director of the National Center for Environmental Economics, OPEI, stated that, given the Agency's lack of data and models, some assumptions had to be made about what the ecosystem looks like. Default assumptions are being made but not very systematically and so this is an area for committee input, he said.

Questions arose about what would be included in sections 4 and 5 of the draft strategic plan, which was not submitted to the Committee for the current meeting. Dr. Owens said that the intent is to list research gaps and assess which ones may be completed in short term, and she noted that input would be sought from the Committee.

Dr. Owens, in response to a question, said that the survey of EPA staff mentioned in the Committee's briefing materials will be made available to the Committee in the future.

<u>How Economic Analysis of Ecological Systems and Services fits into Environmental Protection at EPA</u>

Dr. McGartland stated that his comments would reflect the perspective of economists on an issue of paramount importance to the Agency. He noted that there were many difficult issues involved in valuing ecological systems and services. He proceeded to describe the very specific paradigm that economists use for benefit-cost analysis.

Dr. McGartland provided a slide presentation, "Economics at the Environmental Protection Agency," which addressed statutorily permitted BCA, the structure of EPA, and Executive Order 12866. This order explicitly instructs the Agency to assess all costs and benefits of regulations, both quantifiable and non-quantifiable measures. He then explained the Agency's rule development process were explained and how the assessment of benefits and costs fit into that process He explained the components of an economic analysis, using water quality benefits as an example. Dr. McGartland then addressed questions from Committee members.

A Committee member noted that there is much discussion concerning whether or not monetization of ecological benefits is appropriate, and asked what specific feedback from the Committee would be helpful in this area. Dr. McGartland responded that the Agency staff recognizes that valuation is a paradigm for all agencies, so even if BCA is not universally supported as a concept it is a reality that must be dealt with for any major rule. Draft regulations are being circulated to have all BCA peer reviewed by outside experts. Committee members emphasized the importance of incorporating information about non-monetized benefits in the process.

Quantifiable and non-quantifiable values were discussed. Concern was expressed that regulations cannot be properly assessed if values are unknown or non-quantifiable, and such values may be excluded from consideration. Dr. McGartland said that analysts have an obligation to quantify these values as best they can, although sometimes models simply do not exist. In response to a question, he stated that the rules require "best efforts" to quantify value so estimates of net benefits, thresholds of alternate uses, or probabilistic assessments may be incorporated. Sometimes conservative assumptions are combined to acknowledge certain outcomes. A Committee member commented that such efforts may make the Agency more vulnerable to charges of invalid assumptions and questionable valuations. Dr. McGartland clarified that models with a good characterization of benefits are used as much as the science allows. The more analysis one can do, the more information one can put on the table, he said.

The time course of events in models of ecological systems was discussed. Noting that a fairly liberal use of the term "model" is often made, Dr. McGartland pointed out that economists do address time factors. Some models are simple coefficients for population dynamics, e.g. how water quality affects the ecosystem, and he said discounted costs are used in benefit-cost analysis

There was then a discussion of the validity of willingness to pay as an assessment tool. Dependence on changes in technology, supply, and usage may affect results. Preferences may be lower at the margins, which may make it hard to characterize the meaning of the numerical value. It is often difficult for people surveyed to project their WTP when they do not actually pay, and thus benefits may be overestimated. The difficulty of resolving the issue was acknowledged.

A Committee member remarked on the need for economists to interact with other subject matter experts within the Agency. Dr. McGartland responded that ecologists and economists have not really engaged one another in the past, which has contributed to the difficulties faced now.

In response to comments from Committee members, Dr. McGartland emphasized that the goal of BCA is to inform decision makers and describe the consequences of various policy options, not to justify decisions that are made.

A break was taken at 10:40 a.m. The discussion resumed at 10:55 a.m.

Dr. Grasso reiterated that the purpose of the workshop is to gather information from the Agency on their relevant programs, while the following day would be devoted to a consultation on the draft strategic plan as well as planning for future Committee activities. He asked that members confine their questions to those that will provide information for the consultation.

Perspective from EPA's Office of Research and Development

Dr. Michael Slimak, Associate Director for Ecology, National Center for Environmental Assessment in EPA's Office of Research and Development introduced himself as an ecologist. He proceeded to provide an overview of ORD's activities and address questions from the Committee.

Dr. Slimak provided slides that explained ORD's mission, research and development at EPA, and the decision making process. He stated that ORD's divisions span the risk assessment paradigm. Dr. Slimak presented the high priority research areas, the hierarchy of research planning, and an overview of the environmental economics research strategy. Ecological valuation is a high priority within the research strategy, in which there is a great deal of uncertainty. Problems exist in part because economists do not fully understand how people value ecological services and ecologists are often unfamiliar with economic measuring methods, he said. Economists need to be brought in at the "front end" rather than the end of the ecological risk assessment process.

Dr. Slimak reviewed several of the Agency's efforts to develop multi-year plans involving integration of ecological risk and economics and discussed related research programs including Science to Achieve Results (STAR) grants were reviewed. Dr. Slimak described the National Oceanographic and Atmospheric Agency's (NOAA) Resource Valuation Program as an example of past government efforts in valuing ecological goods and services. He stated that there are many challenges in translating ecological value to economic value, where scarcity of resources is an important issue. Dr. Slimak responded to questions from Committee members.

The Committee asked several questions about ecological risk assessment. A member noted that there seems to be an expectation that the benefit-cost assessment and risk-assessment paradigms be aligned, and he asked about the Agency's use of ecological risk assessment. Dr. Slimak responded that there are a number of places in the Agency where ecological risk assessment is used but not in the context of major rulemakings. He cited the pesticide office as an example where national scale ecological risk assessment is used on a day-to -ay basis. Superfund and other programs use ecological risk assessments at the local scale There are a range of approaches and practices where the methods are used, he said. The member urged caution in aligning the two paradigms.

Dr. Slimak also mentioned Habitat Equivalency Analysis as an ecological valuation technique used by the National Oceanic and Atmospheric Agency (NOAA) that may be of interest to EPA. In the case of an oil spill, NOAA analyzes ecosystem damage in terms of loss of habitat and the actual cost to restore it to the original condition would be determined. Historically, this has been supported by courts as way to value the ecosystem, he said. It is unclear if this technique could be expanded to encompass predictive loss. A Committee member noted that the concept of habitat equivalency is basically an alternative to monetized valuation, a separate effort to find another ecosystem to compensate for the loss of ecological services, not a monetization of loss, the member said. Dr. Grasso said that representatives from other agencies including NOAA would be invited to future meetings for briefings on how they value ecosystem protection and damages to ecological resources

Another member asked if the Agency had a process for adaptive rulemaking in consideration of time-varying responses of the ecosystem and she asked whether the Committee should be considering optimal rules or policies on the interplay of ecological changes and economic policy. She noted that there are dynamic models of sequence of actions that economists can use. Dr. Slimak stated that in the early years of the Agency, most actions were probably one-time decisions. Achieving the next level of environmental protection requires more sophisticated, dynamic efforts. Economic analysis and third level regulations are more difficult. Dr. McGartland mentioned the Total Maximum Daily Load (TMDL) process as an example of more sophisticated analysis.

Perspective from EPA's Regional Offices

Ms. Jerri-Anne Garl, Director, Office of Strategic Environmental Analysis, EPA Region V, provided the perspective of a regional decision maker, noting that the focus of the regions is different since they do not write rules. Their focus is implementing programs. She provided a slide presentation and reviewed the regional decision making process and the regional ecosystem protection network.

Ecosystem characterization rather than valuation has been emphasized. A workshop was held in 2002 on ecosystem protection, which provided a forum for sharing information and resources. Ms. Garl stated that the network was instrumental in ensuring better measures to enhance science and research were included in the Agency's strategic plan. She described the perspective of the regions as "180 degrees different" from the national offices. Current demand at the regional level for making ecological valuation tools available is fairly low right now from a management perspective. She anticipated the use of geospatial tools and as mapping to stimulate questions about the value of ecological resources at risk. In reviewing the usefulness of various tools, Ms. Garl said many activities in her region touched on the question of the value of ecological resources: the process of reviews under the National Environmental Policy Act NEPA review process; review of wetland permits; review of supplemental environmental projects that involve ecosystem health; engaging the public when geographic information and mapping tools are used; assessing TMDLs at the landscape level in order to improve state water quality; and Superfund/Resource Conservation and Recovery Act (RCRA) cleanups. Ms. Garl emphasized the critical importance of funding geospatial data sets. Scientific advice is needed from the Committee so that valuation of ecological resources is more defensible, so that regions will have a consistent set of questions to use in evaluating ecosystem health, and EPA will have advice related to advances in the science of ecosystem assessment.

Dr. Cory Berish, Chief, Planning and Analysis Branch, Region IV, provided an overview of the Southeastern Ecological Framework pilot program, which is a cooperative effort with the University of Florida. Using slides, he described the framework as one designed to incorporate ecosystem protection into decision making by balancing development and protection. Assessment endpoints are based on 20 data points, and then corridors are connected. Dr. Berish pointed out that Alabama has 4 percent of its land protected and the currently the data is not available to convince citizens that more should be protected. The issues ultimately to be addressed are how to work with the general public to value land and how to determine the value of an entire ecosystem. Dr. Berish described a proactive effort to anticipate problems and impacts of building I-69 in the Mississippi delta. The focus is on mitigation by providing data on various alignment proposals.

He stated that the "Southeastern Ecological Framework Geobook : A Decision-Making Support Tool" provides geospatial information about environmental issues that can be designed to address the specific needs of Agency staff, as well as state and local decision makers. In conclusion, Dr. Berish proposed various components that might be used to develop an "environmental benefits index." He presented a graphic showing the index as a "thought slide" suggesting how one might account for all environmental benefits in order to "evaluate the whole."

Questions concerning program funding were raised. Ms. Garl responded that if ecosystem programs are made a regional priority in Region V, the funding can be

directed to the priority ecosystems. Dr. Berish disagreed somewhat, noting that there is not an overall "ecosystem champion" in the Agency focusing on ecosystem issues and priority ecosystems.

A Committee member asked for clarification of the EPA's role in the I-69 example since the Department of Transportation has enabling legislation with an environmental planning component. Dr. Berish stated that in terms of ecosystems, the right tools are not always used by other Agencies. EPA is trying to work with states to be proactive through their state highway departments. M. Garl noted that in many cases various state and federal agencies have developed tools that work for them, and there is not a single set of models they all agree on to best assess cumulative impact.

In response to a question, Ms. Garl and Dr. Berish agreed that the regions are more concerned with ecosystem assessment than pure economic valuation. Ms. Garl added that every step involved in ecosystem assessment and ecosystem valuation needs to involve transparent science that is well accepted and understood.

Dr. Grasso thanked the morning presenters for their participation.

The Committee adjourned for lunch at 12:20 p.m. The discussion resumed at 1:20 p.m.

Dr. Grasso stated that speaker order for the afternoon had been modified, and he introduced Mr. Steven Young, Office of Environmental Information (OEI), as a substitute for the scheduled speaker Ms. Elaine Stanley.

Perspective from EPA's Office of Environmental Information

Mr. Steven Young, Associate Director, Environmental Analysis Division, Office of Environmental Information presented the Young said that Ms. Stanley had been unexpectedly called away on an issue. He provided a slide presentation, which described the mission of OEI as providing the primary infrastructure to collect, manage, access, and use environmental information. Helping people understand all the environmental data publicly available is increasingly a focus of OEI. He noted that OEI is a disseminator of ecological valuation information such as the draft "Report on the Environment" issued in June. Mr. Young reviewed
some specialized capabilities OEI has in terms of data warehousing and he emphasized web uses to increase the visibility of ecological service values and provide a means of informing decision makers. As part of that effort, OEC sees it as important to develop indicators that quantitate service levels, he said.

In response to a question from a Committee member, Mr. Young said that OEI had made significant use of the Heinz Center report, "State of the Nation's Ecosystems." He noted that the report focuses on conditions rather than stressor effects whereas the EPA must

look at stressors and connect the effect of environmental programs on stressors. The Heinz report also frequently cites "data not available."

The issue of data gaps was raised by a member. Mr. Young stated that OEI relies heavily on data collected by other agencies such as U. S. Geological Survey (USGS) and Centers for Disease Control and Prevention (CDC) and he said that the need to partner with others in recognized. There are significant discussions within the Agency designed to determine areas of focus in light of the significant information gaps and budgetary constraints, he said. Dr. Berish described a new goal structure in the regions, with goal teams in each region. There is accountability at the regional and state level.

In response to a Committee member, Mr. Young said that OEI has done some work in the area of conveying uncertainty, which included funding some work on the use of graphs. He acknowledged that many believe that uncertainty is not adequately conveyed in Agency information products.

A Committee member asked for a description of the academic background of OEI staff members. Mr. Young replied that there is a wide range of specialties, with numerous PhDs and a small cadre of scientists, toxicologists, and human health experts. He noted that there currently is only one economist because of staff departures. There is not a large research staff but OEI works closely with ORD.

Perspective from EPA's Office of Water

Dr. Michael Shapiro, Deputy Assistant Administrator, Office of Water, began his remarks by commenting that he has worked in all the major offices of the Agency. Noting that OW is the largest beneficiary of work on ecosystem, he characterized the valuing the protection of ecological systems and services as of critical importance to his office. Using a slide program, he described the EPA water program mission, the framework for protecting and restoring the nation's waters through the Clean Water Act, and the Safe Drinking Water Act. Dr. Shapiro stated that ecosystem benefits are part of every rulemaking package in OW. While environmental benefits traded in markets are relatively easy to estimate, OW has had less success with estimating nonmarket benefits.

Dr. Shapiro provided a sample problem posed by the Agency's Combined Animal Feeding Operation rulemaking, noting that failure to value benefits is not always because of economic tools but often because of lack of data on ecological effects and lack of appropriate ecological models. The extent of resources required is limiting as well. He described various tools and approaches used by OW analysts and he listed some additional tools and approaches needed. The latter included more ecological effects information, more flexible biophysical models, valuation methods for ecosystem changes, and scientifically supportable alternatives to monetization. In conclusion, Dr. Shapiro

emphasized the need to move beyond the "low hanging fruit" of environmental and ecosystem protection.

In response to a question from a Committee member on the Agency rulemaking process in general, Dr. Shapiro stated that an Agency-wide work group is assembled for major rules that includes representatives from program offices, policy offices, enforcement, and others to provide advice as part of a team effort. One function is to identify cross-program issues to address. He emphasized the extensive history of collaboration between OW and Office of Air and Radiation (OAR).

A Committee member asked if there is ever an opportunity to review and reflect after a rulemaking is complete and diagnose what could and should have been done differently on individual rules, given any unanticipated environmental effects. Dr. Shapiro replied that while there has not been a specific "lessons learned" document, there is awareness by management and others of various limitations that have existed in terms of data and other factors.

Dr. Shapiro responded to a question about the Water program's use of benefit-cost analysis at various levels of decision making. At the watershed level, states evaluate impacts on water quality and also in terms of what is considered reasonable uses for the water body. Costs for restoring degraded water are also part of these evaluations.

Dr. Nugent asked Dr. Shapiro to comment on the benefit-cost analysis aspects of the proposed 316b rule on comfort cooling towers and individual sites-specific analyses that might be involved. Dr. Shapiro said that benefit-cost analysis for individual sites where costs exceed benefits was an aspect of the proposed rule that was still under consideration and he said he could not comment further.

A Committee member asked for comment on public feedback on CAFO. Dr. Shapiro stated that there had been both positive and negative comments with lots of attention to the benefits estimates. He noted that the rule benefited significantly from scrutiny and comments during the review periods.

<u>Perspective from EPA's Office of Air and Radiation</u>

Mr. Robert Brenner, Deputy Assistant Administrator, Office of Air and Radiation, provided an overview of OAR experience in valuing the protection of ecological systems and services, using slides. He noted that an OMB analysis of federal regulations showed that the Clean Air Act Amendments (CAAA) resulted in benefits twice as large as costs. Mr. Brenner reviewed the OAR mission, environmental programs, and the role of ecosystem benefits in program and regulatory development. He discussed the importance of OAR's major study of the costs and benefits of the Clean Air Act, the "Section 812 study," which is conducted periodically, and its efforts to improve OAR's approaches for valuing protection of ecological resources. OAR also has monetized environmental

benefits in support of rulemakings such as visibility and nitrogen deposition reduction. In valuation of visibility work in Colorado, it was determined that seeing the mountains is more important to people than environmental or health impacts. Mr. Brenner observed that often the public is more motivated by certain ecosystem benefits, such as visibility, than it is by public health concerns. He commented that this phenomenon, and the reasons for it, is a source of great speculation by OAR staff

Mr. Brenner stated that OAR is fortunate to have a network of monitors to assess and track ambient air conditions and air deposition, and he asked for advice from the Committee on how best to make progress in assessing the non-health- related aspects of air pollution. Gaps in understanding of the ecological impact of air pollution are limiting the ability of OAR to monetize benefits, he said. Quantification of impacts would be helpful in the shorter term while monetization methods are developed. Mr. Brenner commented that for the near term the ability to generate benefit-cost analysis estimates will be limited in part because of limited data, and he emphasized the importance of a paradigm or framework to ensure continued consideration of ecosystem valuation in the policy arena.

A Committee member asked Mr. Brenner to comment on the success of OAR in its economic benefits analysis. Mr. Brenner noted that there has been skepticism over the years about such analyses, but OAR determined that developing methods and analyses was important and that it was important to learn what would be accomplished within the limits of the benefit-cost paradigm. Part of the concern with benefit-cost analysis is that it would not capture whole picture. The public view of the air pollution impacts is one example. While there are health effects benefits from the work on fine particles and those effects are documented in the epidemiology literature, the public may be much more concerned over ecological benefits. Programs that are implemented must respond to legitimate public concerns. The member asked if additional analyses were available to capture ecological effects, would these be included in the benefit-cost analyses. Mr. James DeMocker, leader of OAR's Project Team for the 812 Study, responded that the Agency's current plans for the next 812 Study intended to explore this question more fully. Although OAR has tended to focus on health effects, the obligation to provide comprehensive analyses is taken seriously. Mr. Brenner noted that while the dollar figures associated with health benefits are impressive and large, they also lose meaning to people. OAR plans to include in benefits analyses quantitative measures of physical effects (e.g., health statistics such as how many deaths or asthma attacks have been avoided) in addition to dollars captured in benefits. OAR is seeking a similar approach for ecological effects.

In regard to the example of the public's expressed concern for visibility effects, rather than public heath impacts, a Committee member noted that it was unlikely that the public had read and fully understood the epidemiology studies underlying the health benefit analysis. He linked this observation to the assumption made by economists that the

public fully understands the environmental effects that are the subject of Mr. Brenner agreed that this is an important point. People can see the effects of air pollution and cannot see human health and other effects, he said, and people react more strongly as they become more aware.

The difficulties inherent in establishing dialogue between ecologists and economists were discussed. Mr. DeMocker commented on the similarity between this problem and another issue encountered between health scientists and economists in valuing the health effects of air toxics. At an EPA /SAB workshop on this problem in 2000, he noted that a suggestion was made to redefine the nature of the endpoints to be valued, so that the endpoints would not necessarily mimic the chemical-specific, disease-specific endpoint used for cancer assessment. It was suggested that the commodities economists were asked to value be redefined and that this might help bridge the gaps within the existing paradigm. Mr. Brenner expressed hope that it will be possible to achieve consensus on characterizing ecosystem benefits and how to portray them in a meaningful way in the 812 analysis.

A Committee member emphasized the importance of raising the status accorded to expressed desires such as clearly viewing mountains, and she said that services which are nonfunctional should not be downplayed. As a start, willingness-to-pay should be the basis, but other effects should be noted. Mr. Brenner expressed support for providing a statement listing various effects so a policy maker would be able to describe to the public monetized and non-monetized factors that weigh heavily in decision making.

Perspective from EPA's Office of Pesticide Programs (OPP)

Mr. James Jones, Director, Office of Pesticide Programs, presented slides that described the mission of the pesticide program to protect human health and the environment from "unreasonable adverse effects" of pesticide use. There are currently 1,000 active pesticides registered with about 30 new products registered annually. OPP largely operates outside the rulemaking process used by the rest of the Agency, he said. OPP conducts an ecological risk assessment in conjunction with every new chemical decision in the pesticide program. The term "benefits" in the pesticide program, however, is used differently in OPP from in other offices in EPA; OPP uses to term "benefits" to refer to the pesticide's usefulness for its intended pesticidal purpose. Thus OPP does not attempt to assess or assign quantitative value to ecological benefits, as other parts of EPA may do, and the program focuses on ecological risk, rather than on valuation of ecological valuation.

Despite this focus on ecological risk assessment and despite a relatively rich amount available about a pesticide and its effects, OPP scientists now do note provide decision makers with information about the likely environmental impacts resulting from approval and use of a specific chemical. Current methods do not provide decision makers with

information about ecosystem effects or information about a chemical's impact on ecological resources and that resource's value. Mr. Jones said the environmental effects of pesticides on pollinators are an example of one area where more data and analysis is needed. He cited the Agency's ban of DDT (a decision made on the basis of human health endpoints, where there are now strong data related to ecological effects) as a possible case study to be conducted to show the value of ecological protection. He believed it would still be an example where a scientific assessment of value would be difficult, although desirable.

A discussion followed concerning how OPP characterizes pesticide effects on environmental attributes. Mr. Jones explained a compound that poses relatively little risk to achieve moderate pesticidal benefits will be subject to a different level of analysis than one with higher risk. Well-characterized economic assessments are often needed in the latter case. The economic benefits of society's use of the approved pesticide are weighed against economic costs of not approving the pesticide. Concern was expressed that the methods used to determine value may be inadequate. Mr. Jones said there must be confidence in the determination of benefits of use, and he added that aggressive ERA is critical. A member commented that the presentation seemed totally based on risk assessment, and that the ecological value needs to be evaluated as well. Mr. Jones acknowledged that it is an aspect of analysis that is not as thorough or robust as it could be.

A Committee member asked about the burden of proof on the manufacturers. Mr. Jones stated that OPP informs the manufacturers of the evidence required to prove benefits. The burden of proof rests on the manufacturers. While the vast majority of new chemicals meet the standards for acceptable ecological impact, the old chemicals are much more worrisome because current standards are much stricter. Most of the risk with new chemicals is order of magnitude, he said.
In response to a member's question, Mr. Jones affirmed that bioaccumulation is included in human health considerations and ecological impacts are tracked through bioconcentration effects.

A break was taken at 3:40 p.m. Discussion resumed at 4:00 p.m.

Perspective from EPA's Office of Pollution Prevention and Toxics (OPPT)

Dr. Robert E. Lee, Chief, Economic and Policy Analysis Branch, Office of Pollution Prevention and Toxics, described the mission of his office as managing risks from chemical manufacture and use in commerce and he noted that there currently are 81,600 chemicals in inventory. Using a slide presentation, he reviewed the relevant statutes for OPPT, the Toxic Substances Control Act (TSCA) and the Pollution Prevention Act. TSCA provides for collecting information and managing risks associated with chemicals in commerce. The focus of the Pollution Prevention Act is eliminating pollutants at the

source of use, such as dry cleaners and print shops. Congress defined unreasonable risks in a manner that can include BCA, he said. Dr. Lee said that economic valuation would be useful on an integrated basis addressing health and ecological concerns. Through voluntary programs, OPPT could encourage others to make responsible decisions by providing quantitative information. He also described OPPT's historical interest in ecological benefits and he particularly noted the 2002 "Framework for Economic Assessment of Ecological Benefits" (Dr. Nugent provided a link to this publication on the Committee's website). Dr. Lee concluded by saying that providing smooth linkages between ecological and economic tools would be very helpful in OPPT's work, since quantitative data is always more persuasive than qualitative information.

In response to a question, Dr. Lee explained that economic analysis is not part of the high production volume chemical program, although hazard information currently is being collected and risk analysis will be conducted in the future. Screening is based on the volume of chemicals. He emphasized that the program is a voluntary partnership with companies in which the Agency often provides cost information. A member suggested that use of cost effectiveness data and BCA could be associated with the design of sound environmental approaches to avoid both risk and ecological impact. Ms. Lynne Blake-Hedges, OPPT, stated that work is being done with small businesses in which OPPT offers its scientific expertise and proposes preferable alternatives. The same process is followed with new chemicals, based on hazard information but not specifically exposure or risk.

Perspective from EPA's Office of Solid Waste and Emergency Response (OSWER)

Mr. Deveraux Barnes, OSWER, provided a slide presentation to explain the mission and programs within OSWER related to valuing ecological systems and services. There are three different cleanup programs within OSWER, and in his view, none successfully quantify or monetize benefits. He went on to describe tools used in the decision making process, noting that there is not a full suite of tools available to conduct benefits analysis within OSWER's programs. A means of linking adverse impacts to economic valuation techniques would be useful, he said.

A Committee member asked what tools are used to determine a balance between ecological risks associated with different clean-up sites options. As an example, he suggested that there is likely a greater ecological impact in dredging the Hudson River to eliminate PCBs than in allowing them to remain undisturbed. Mr. Barnes responded that the overall standard is to protect human health and the environment using the best estimates and evaluating the impact. Mr. David Charters, OSWER, added that OSWER is precluded by law from acting as natural resource trustees and thus is dependent on trustees from other agencies such as the Department of the Interior in analyzing impacts on natural resources. In response to another member, Mr. Charters said that OSWER is very open to using other tools in selecting technology options for remedial actions, but

reiterated that caution must be exercised because of statutory prohibitions. Methods for prioritizing cleanups are being devised in tandem with human health considerations, which will always take priority over ecological concerns, he said. OSWER has a good method of showing successes with human health but not ecological health, and Mr. Charters said an ability to demonstrate ecological successes is needed.

A Committee member suggested that there seem to be significant differences among the Agency's offices in use of valuation tools and methods that are used. Mr. Barnes acknowledged that OPP had some major differences; but that other program offices are not different by design, although they have historically developed and implemented their ecological assessment tools independently. Program offices with many rulemakings have analyses required by those rulemakings; OSWER is more site-specific and retrospective, since it must respond to Superfund sites that occur. All of the programs need assistance, he said.

In response to a final question, Mr. Charters stated that the term "ecological endpoint" is an assessment endpoint, an attribute that is valued in the ecosystem. There is no quantitative value necessarily attached to it but the "ecological endpoint" plays an important role in the ecological assessment.

Perspective from EPA's Smart Growth Program

Mr. Geoffrey Anderson, OPEI, provided an overview via a slide program of the Agency's Smart Growth program. Smart Growth relates to development patterns and their environmental impacts. He described Smart Growth principles, compared current and Smart Growth regional and local development patterns, and explained EPA's role in providing information and resources to foster Smart Growth. Mr. Anderson observed that the New York Watershed Agreement is an example of applying ecosystem service valuation to Smart Growth. It demonstrated to the City of New York and other localities the cost implications of different development options that would have had different ecological impacts.

In his view, the relevance of economic valuation to the Smart Growth program is in influencing both private sector development and community zoning laws through national efforts. Information on valuation would be best used in carefully targeted areas where specific values could be identified and a "changeable result" influenced. Mr. Anderson said that communities with scarce resources may not be affected by an awareness of monetized ecological benefits, so it is important to carefully target the audience of any valuation efforts. A Committee member noted that there are many communities that value habitats and open spaces and offer programs making it in the best interest of developers to consider these factors. The member also said that there is research work being done on bundling of public good and private interest. A member commented that something similar to "green certificates" may be useful within the Smart

Growth program, and Mr. Anderson noted that some organizations such as the Urban Land Institute are developing programs. Value stacking and buffering may also be relevant.

Opportunity for Audience Input

Dr. Grasso invited members of the public to comment.

Dr. Marilyn Parson, an ecological economist with the National Association of Homebuilders, stated that her organization is very interested in the process the Committee is undertaking and will continue to follow its efforts. She said that the EPA's benefit-cost analysis could be improved because: (1) too many lawsuits have been driving agency actions; (2) too much reliance on outside contractors has occurred; and (3) the peer review process has been ineffective. Dr. Parson stated that while the Agency has a large number of staff economists, their work is fragmented and their regulatory analyses leave a lot to be desired. She stated that her organization has many PhD economists on its staff and, she offered their assistance to the Agency in its efforts.

Dr. Edward Maillett, an economist with the U.S. Fish and Wildlife Service, stated that Critical Habitat Program is the only component of the Endangered Species Act that allows economic valuation. It is becoming increasingly important to measure secondary benefits that may exist in species protection, he said, partly because it is playing a larger role in the decision making process. It is difficult to use economic analysis as good decision making tool when ancillary benefits to society cannot be determined. Dr. Maillett expressed appreciation for any guidance the Committee could provide, since it is an area he is concerned with as an applied economist. He encouraged the Committee to ensure their recommendations are simple so they can be readily understood and used by senior officials and the public. Dr. Maillett also noted that while the Clean Water Act and the Clean Air Act are often mentioned, he is continually asked what part of rulemaking is affecting the ecosystem. In conclusion, he expressed support for the Committee in its efforts.

Final Remarks

Dr. Grasso thanked Agency presenters and concluded that the workshop demonstrated the importance of valuing ecosystems to decision making. The next day's deliberations will provide a more hands-on opportunity for the Committee to provide advice on the Agency's draft strategic plan for ecological benefits, he said. During this consultative process, the Committee has an opportunity to make a significant contribution. Plans for Committee activities during the next three years will also be discussed, he said.

Dr. Nugent reminded Committee members and the public that the meeting would convene at 8:30 a.m. the following day.

Dr. Grasso adjourned the workshop at 5:45 p.m.

Respectfully Submitted:

/s/ Angela Nugent
Designated Federal Officer

Certified as True:

/s/ Domenico Grasso
Chair

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by the Committee members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters, or reports prepared and transmitted to the EPA Administrator following the public meetings.

Attachments

Attachment A: Roster

Attachment B: Federal Register Notice

Attachment C: Workshop Agenda

Attachment A: Roster

U.S. Environmental Protection Agency
Science Advisory Board
Committee on Valuing the Protection of Ecological Systems and Services

CHAIR

Dr. Domenico Grasso, Rosemary Bradford Hewlett Professor and Chair, Picker Engineering Program, Smith College, Northampton, MA

Also Member: Executive Committee
Environmental Engineering Committee

SAB MEMBERS

Dr. William Louis Ascher, Dean of the Faculty, Bauer Center, Claremont McKenna College, Claremont, CA

Dr. Gregory Biddinger, Environmental Sciences Advisor, Exxon Mobil Refining and Supply Company, Fairfax, VA

Also Member: Ecological Processes and Effects Committee

Dr. Ann Bostrom, Associate Professor, School of Public Policy, Georgia Institute of Technology, Atlanta, GA

Dr. James Boyd, Senior Fellow, Director, Energy & Natural Resources Division, Resources for the Future, Washington, DC

Dr. Robert Costanza, Professor/Director, Gund Institute for Ecological Economics, School of Natural Resources, University of Vermont, Burlington, VT

Dr. Terry Daniel, Professor of Psychology and Natural Resources, Department of Psychology, Environmental Perception Laboratory, University of Arizona, Tucson, AZ

Dr. A. Myrick Freeman, Research Professor of Economics, Department of Economics, Bowdoin College, Brunswick, ME

Dr. Dennis Grossman, Vice President for Science, Science Division, NatureServe, Arlington, VA

Dr. Geoffrey Heal, Paul Garrett Professor of Public Policy and Business Responsibility , Columbia Business School, Columbia University, New York, NY

Dr. Robert Huggett, Vice President for Research and Graduate Studies, Office of Vice President for Research and Graduate Studies, Michigan State University, East Lansing, MI

Dr. Klaus Lackner, Ewing Worzel Professor of Geophysics, Earth and Environmental Engineering, Columbia University, New York, NY

Dr. Douglas E. MacLean, Professor, Department of Philosophy, University of North Carolina, Chapel Hill, NC

Dr. Harold Mooney, Paul S. Achilles Professor of Environmental Biology, Department of Biological Sciences, Stanford University, Stanford, CA

Dr. Richard Norgaard, Professor of Energy and Resources, Energy and Resources Program, Agricultural and Resource Economics, University of California at Berkeley, Berkeley, CA
Also Member: Environmental Economics Advisory Committee

Dr. Louis F. Pitelka, Director and Professor, Appalachian Laboratory, University of Maryland Center for Environmental Science, Frostburg, MD

Dr. Stephen Polasky, Fesler-Lampert Professor of Ecological/Environmental Economics, Department of Applied Economics, University of Minnesota, St. Paul, MN
Also Member: Environmental Economics Advisory Committee

Dr. Paul G . Risser, Chancellor, Oklahoma State Regents for Higher Education, Oklahoma City, OK

Dr. Holmes Rolston, University Distinguished Professor, Department of Philosophy, Colorado State University, Fort Collins, CO

Dr. Joan Roughgarden, Professor, Biological Sciences and Evolutionary Biology , Stanford University, Stanford, CA

Dr. Mark Sagoff, Senior Research Scholar, Institute for Philosophy and Public Policy, School of Public Affairs, University of Maryland, College Park, MD

Dr. Kathleen Segerson, Professor, Department of Economics, University of Connecticut, Storrs, CT

Also Member: Environmental Economics Advisory Committee

Dr. Paul Slovic, Professor, Department of Psychology, Decision Research, Eugene, OR

Dr. V. Kerry Smith, University Distinguished Professor, Department of Agricultural and Resource Economics, College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC
Also Member: Advisory Council on Clean Air Compliance Analysis

Dr. Robert Stavins, Albert Pratt Professor of Business and Government, Environment and Natural Resources Program, John F. Kennedy School of Government, Harvard University, Cambridge, MA
Also Member: Environmental Economics Advisory Committee

Dr. Valerie Thomas, Research Scientist, Princeton Environmental Institute, Princeton University, Princeton, NJ
Also Member: Environmental Engineering Committee

Dr. Barton H. (Buzz) Thompson, Jr., Robert E. Paradise Professor of Natural Resources Law and Vice Dean , Stanford Law School, Stanford University, Stanford, CA

SCIENCE ADVISORY BOARD STAFF
Dr. Angela Nugent, Designated Federal Officer, 1200 Pennsylvania Avenue, NW, Washington, DC, Phone: 202-564-4562, Fax: 202-501-0323, (nugent.angela@epa.gov)

Attachment B: Federal Register Notice

Science Advisory Board Staff Office; Committee on Valuing the Protection of Ecological Systems and Services Notification of Upcoming Public Workshop and Public Advisory Committee Meeting

[Federal Register: October 22, 2003 (Volume 68, Number 204)]
[Notices]
[Page 60368-60369]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr22oc03-86]

ENVIRONMENTAL PROTECTION AGENCY
[FRL-7577-4]

Science Advisory Board Staff Office; Committee on Valuing the Protection of Ecological Systems and Services Notification of Upcoming Public Workshop and Public Advisory Committee Meeting

AGENCY: Environmental Protection Agency (EPA).
ACTION: Notice.

SUMMARY: The EPA Science Advisory Board (SAB) Staff Office is announcing a non-advisory public workshop and a public advisory meeting
of the Board's Committee on Valuing the Protection of Ecological Systems and Services (Committee).

DATES: October 27, 2003. The Committee will participate in an Initial EPA Background Workshop for the Committee from 9 a.m.-6 p.m. (Eastern Time).
October 28, 2003. A public advisory meeting for the Committee will be held from 8:30 a.m. to 6 p.m. on October 28, 2003.

ADDRESSES: The meeting location for the October 27, 2003 workshop and the October 28, 2003 Committee meeting will be in Washington, DC. The meeting location will be announced on the SAB Web site, http://www.epa.gov/sab in advance of the meeting.

FOR FURTHER INFORMATION CONTACT: Any member of the public wishing further information regarding the upcoming workshop, the upcoming advisory meeting, or the Committee may contact Dr. Angela Nugent, Designated Federal Officer (DFO), U.S. EPA Science Advisory Board (1400A), 1200 Pennsylvania Avenue, NW., Washington, DC 20460; by telephone/voice mail at (202) 564-4562; or via e-mail at nugent.angela@epa.gov. General information about the SAB can be found

in the SAB Web site at http://www.epa.gov/sab.

SUPPLEMENTARY INFORMATION:

Background: Pursuant to the Federal Advisory Committee Act, Public Law 92-463, Notice is given that the Committee will hold a public meeting, as described above, to provide initial consultative advice on the development of EPA's Strategic Plan for Ecological Benefits and to plan the Committee's work.

Background on the Committee and its charge was provided in a Federal Register notice published on March 7, 2003 (68 FR 11082-11084).

The overall charge to the Committee is to assess Agency needs and the state of the art and science of valuing protection of ecological systems and services, and then to identify key areas for improving knowledge, methodologies, practice, and research.

At its first advisory meeting, the Committee will be providing consultative advice on the Agency's plans to develop an ``Ecological Benefits Assessment Strategic Plan.'' Documents related to that consultation will be available at the following website, maintained by EPA's National Center for Environmental Economics at: http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/homepage?Opendocument. A notice in the ``News Alerts'' box will direct readers to the materials.

The purpose of the day-long workshop, which precedes the advisory meeting, will be to provide a brief introduction for the Committee to the major types of EPA decisions involving valuing ecological systems and services, current EPA tools and EPA's needs.

Agendas for the public workshop and advisory meeting will be posted
on the SAB website ten days before the dates of those events.

Procedures for Providing Public Comment. It is the policy of the EPA Science Advisory Board (SAB) Staff Office to accept written public comments of any length, and to accommodate oral public comments whenever possible. The EPA SAB Staff Office expects that public statements presented at its meetings will not be repetitive of previously submitted oral or written statements. Oral Comments: In general, each individual or group requesting an oral presentation at a face-to-face meeting will be limited to a total time of ten minutes (unless otherwise indicated). For conference call meetings, opportunities for oral comment will usually be limited to no more than three minutes per speaker and no more than fifteen minutes total. Interested parties should contact the Designated Federal Official (DFO)
identified above at least one week prior to the meeting in order to be placed on the public speaker list for the meeting. Speakers should bring at least 35 copies of their comments and presentation slides for distribution to the participants and public at the meeting. Written Comments: Although written comments are accepted until the date of the meeting (unless otherwise stated), written comments should be received in the SAB Staff Office at least one week prior to the meeting date so that the comments may be made available to the committee for their consideration. Comments should be supplied to the DFO at the address/

contact information noted above in the

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following formats: One hard copy with original signature, and one electronic copy via e-mail (acceptable file format: Adobe Acrobat, WordPerfect, Word, or Rich Text files (in IBM-PC/Windows 95/98 format)). Those providing written comments and who attend the meeting are also asked to bring 35 copies of their comments for public distribution.

Meeting Accommodations: Individuals requiring special accommodation to access these meetings, should contact Dr. Nugent at least five business days prior to the meeting so that appropriate arrangements can be made.

Dated: October 16, 2003.

Vanessa T. Vu,

Director, EPA Science Advisory Board Staff Office.

[FR Doc. 03-26665 Filed 10-21-03; 8:45 am]
BILLING CODE 6560-50-P

Attachment C: Workshop Agenda

EPA Science Advisory Board
Committee on Valuing the Protection of Ecological Systems and Services
Initial EPA Background Workshop
October 27, 2003
J.W. Marriott, 1331 Pennsylvania Avenue NW, Washington DC 20004
Draft Agenda

Purpose: To provide a brief introduction for the Committee to the major types of EPA decisions involving valuing ecological systems and services, current EPA tools and EPA's needs.

9:00-9:10	Introduction and Welcome from EPA SAB Staff Office	Dr. Angela Nugent Dr. Vanessa Vu
9:10-9:45	Purpose of Workshop and Introduction of Members of the Committee and Agency Workshop Presenters and Key Staff	Dr. Domenico Grasso, Chair, and Committee
9:45-10:15	Welcome and Introduction to EPA's Interest in Developing and Implementing a Strategic Plan for Ecological Benefits	Ms. Louise Wise, Acting Deputy Associate Administrator, Office of Policy Economics and Innovation
10:15-10:30	Break	10:30-10:45
10:30-11:00	How Economic Analysis of Ecological Systems and Services fits into Environmental Protection at EPA	Dr. Albert McGartland, EPA- Office of Policy, Economics, and Innovation
11:00-11:30	Perspective from EPA's Office of Research and Development	Dr. Michael Slimak, Associate Director for Ecology, National Center for Environmental Assessment, Office of Research and Development
11:30-12:15	Perspective from EPA's Regional Offices	Ms. Jerri-Anne Garl, Director, Office of Strategic Environmental Analysis, EPA Region V; Dr. Cory Berish, Chief, Planning and Analysis Branch, Region IV
12:15-1:15	Lunch	
1:15-1:45	Perspective from EPA's Office of Water	Dr. Michael Shapiro, Deputy Assistant Administrator, Office of Water
1:45-2:15	Perspective from EPA's Office of Environmental Information	Ms. Elaine Stanley, Director, Office of Information Analysis and Access; Office of Environmental Information
2:15-2:45	Perspective from EPA's Office of Air and Radiation	Mr. Robert Brenner, Deputy Assistant Administrator, Office of Air and Radiation
2:45-3:15	Perspective from EPA's Office of Pesticide Programs	Mr. James Jones, Deputy Director, Office of Pesticide Programs
3:15-3:30	Break	
3:30-4:00	Perspective from EPA's Office of Pollution Prevention and Toxics	Dr. Robert E. Lee II, Chief, Economic and Policy Analysis Branch, Office of Pollution Prevention and Toxics
4:00-4:30	Perspective from EPA's Office of Solid Waste and Emergency Response	Mr. Deveraux Barnes, Director, Office of Program Management, Office of Solid Waste and Emergency Response

4:30-5:00	Perspective from EPA's Smart Growth Program	Mr. Geoffrey Anderson, Director, Development, Community and Environment Division EPA-Office of Policy, Economics, and Innovation
5:00-5:30	Opportunity for Audience Input	
5:30-5:45	Final Remarks	Dr. Domenico Grasso
5:45	Adjourn	